

## PATENT ABSTRACTS OF JAPAN

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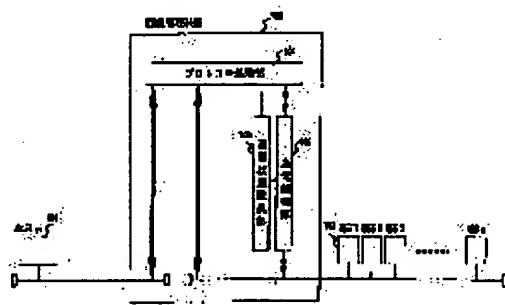
## (54) COMMUNICATION LINE CONTROL METHOD

## (57)Abstract:

PROBLEM TO BE SOLVED: To obtain the communication line control method in which an interrupted line is regarded as a line not in use and the use of other terminal equipment is attained by tentatively interrupting the line while keeping the session even without a line interrupt request when the communication between a host device and plural terminal equipments is not conducted for a prescribed time.

SOLUTION: A communication state monitor section 105 checks an access time of each terminal equipment registered in a communication state recording table for each predetermined time t1 and clears a flag of a terminal equipment 102 of the communication state recording table when the terminal equipment 102 does not make transmission/reception for a prescribed time t2 or over. Then a protocol processing section 104 informs it to the terminal equipment 102 that the line is tentatively interrupted and a communication control section 106 interrupts the line tentatively. Then the communication line control method is obtained in which the terminal equipment 102 in a communication enable state with the host device 101 through the connected line by not actually making

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communication is tentatively interrupted to avoid useless occupancy of the line and number of apparent connection lines is increased.

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**CLAIMS**

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[Claim(s)]

[Claim 1] Between said host equipment by which the communicative circuit is connected with host equipment using the network formed among two or more terminals, and said terminal When there is no transmission or reception of data beyond predetermined time, even if there is no disconnect request about the circuit under said connection A session is the line-control approach characterized by cutting connection of said circuit temporarily, holding, considering that the cut circuit is an intact circuit, and enabling use of the circuit by other terminals.

[Claim 2] It is the line-control approach characterized by to consider that the circuit cut temporarily [ said ] when a session cut the circuit by the side of a network temporarily, without ending and had generating of the transmit data from the line-connection demand or host side from a terminal side is an intact circuit when the received data from a network side and the transmit data by the side of a network are not generated beyond predetermined time using the line control equipment which connects a network to a host, and to treat as a connectable circuit.

[Claim 3] The line-control approach according to claim 2 characterized by memorizing the transmit data from said host side to a buffer when connection is tried again and the circuit cut temporarily [ said ] cannot be connected immediately.

[Claim 4] The line-control approach according to claim 2 characterized by controlling time amount until it judges that the use condition of the circuit by the side of said network is supervised, and there are not received data from a network side and transmit data by the side of a network.

[Claim 5] A new line connection demand and the re-connection request of the circuit from the terminal side cut temporarily Or the re-connection request by transmit data generating to the terminal cut from the host side temporarily It is the line-control approach according to claim 2 which makes priority connection of said re-connection request of the circuit cut temporarily when it competes with a new connection request, and is characterized by controlling not to make new connection when said new connection lowers priority and the number of terminals under connection has reached the number of Maximum connection.

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[Translation done.]

**JAPANESE** [JP,09-162908,A]

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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the line-control approach available to the line control of the communication link performed using the telephone line and the CATV network of a multimedia terminal.

[0002]

[Description of the Prior Art] Drawing 12 is the explanatory view of the conventional communication mode of the host and terminal which used the line switching network. Data transfer is started because the line control equipment with which the communication link with the terminal 1 connected to the line switching network - n, and a host received the circuit use demand from a terminal or a host secures the circuit which connects each and permits use. For example, the line control equipment 903 which received the circuit use demand from terminal 1 902 assigns the circuit which is not used from a current circuit operating condition in the processing section 904 at the time to terminal 1 902, and permits the communication link with a host 901. On the other hand, in spite of having received the circuit use demand from terminal 1 902, when all the circuits are using it, processing of whether to refuse circuit use is performed by notifying whether the circuit use demand of terminal 1 902 is made to stand by, and that all circuits are using it to terminal 1 902 until the circuit which became intact [ line control equipment 903 ] occurs. Unless the circuit once secured in the above-mentioned procedure of operation for communication link activation publishes the demand of line disconnection from a terminal or a host, the use is permanently guaranteed by line control equipment 903.

[0003]

[Problem(s) to be Solved by the Invention] However, as mentioned above, by the communication mode by the conventional line switching network, once a certain terminal secures use of one circuit, unless the demand of line disconnection will be published, it is not concerned with the existence of commo data, but a circuit is occupied. Therefore, when the terminal occupied all the numbers of circuit that can connect line control equipment, it became connection impossible to a new line connection demand, and it had to stand by until a certain terminal circuit in use cut the circuit, in order for the terminal to use a circuit, and had the trouble that the circuit in which many connection is possible had to be prepared for the required communication link of real-time requirement.

[0004] In consideration of the technical problem of the communication mode by the conventional line switching network shown above, even if this invention is the same number of circuit, it aims at offering the line-control approach whose line connection is possible to much more many terminals compared with the former.

[0005]

[Means for Solving the Problem] This invention of claim 1 between said host equipment by which the communicative circuit is connected with host equipment using the network formed among two or more terminals, and said terminal When there is no transmission or reception of data beyond predetermined time, even if there is no disconnect request about the circuit under said connection A session is the line-

control approach which cuts connection of said circuit temporarily, holding, considers that the cut circuit is an intact circuit, and enables use of the circuit by other terminals.

[0006] When the received data from a network side and the transmit data by the side of a network do not generate this invention of claim 2 beyond predetermined time using the line control equipment which connects a network to a host, a session is the line-control approach which considers that the circuit cut temporarily [ said ] is an intact circuit, and treats as a connectable circuit, when the circuit by the side of a network is cut temporarily, without ending and there is generating of the transmit data from the line-connection demand or host side from a terminal side.

[0007] When this invention of claim 3 tries connection again and the circuit cut temporarily [ said ] cannot be connected immediately, it is the line-control approach of memorizing the transmit data from said host side to a buffer.

[0008] It is the line-control approach which controls time amount until it judges that this invention of claim 4 supervises the use condition of the circuit by the side of said network, and does not have the received data from a network side, and the transmit data by the side of a network.

[0009] A new line connection demand and the re-connection request of the circuit from the terminal side cut temporarily this invention of claim 5 Or the re-connection request by transmit data generating to the terminal cut from the host side temporarily When priority connection of said re-connection request of the circuit cut temporarily when it competes with a new connection request is made, said new connection lowers priority and the number of terminals under connection has reached the number of Maximum connection, it is the line-control approach controlled not to make new connection.

[0010] In this invention of claim 1, when there is no transmission or reception of data beyond predetermined time between host equipment and a terminal, even if there is no disconnect request about the circuit under said connection, a session cuts connection of said circuit temporarily, holding, considers that the cut circuit is an intact circuit, and enables use of the circuit by other terminals.

Thereby, a circuit can be used efficiently.

[0011] In this invention of claim 2, the line control equipment which connects a network to a host, for example The last time of day when the received data from a network side and the transmit data by the side of a network were generated is memorized. When the received data from a network side and the transmit data by the side of a network are not generated beyond predetermined time When the circuit by the side of a network is cut temporarily, without ending and there is generating of the transmit data from the line connection demand or host side from a terminal side, a session considers that the circuit cut temporarily is an intact circuit, and connection \*\*\*\* treats it as a circuit.

[0012] In this invention of claim 3, when connection is tried again and the circuit cut temporarily cannot be connected immediately for example, the transmit data from a host side is memorized to a buffer.

[0013] The use condition of the circuit by the side of a network is supervised, and time amount until it judges that there are not received data from a network side and transmit data by the side of a network is controlled by this invention of claim 4, for example.

[0014] In this invention of claim 5, when connecting a new circuit for example, and generating of the transmit data from the line connection demand or host side from a terminal side competes, priority is given to re-connection of the circuit cut temporarily.

[0015]

[Embodiment of the Invention] Below, the gestalt of implementation of the line-control approach of this invention is explained based on a drawing.

(Gestalt of the 1st operation) Drawing 1 is the block diagram of the whole system in the line-control approach of the gestalt the 1st operation concerning this invention. As for host equipment and 102, in drawing 1, 101 is [ a terminal unit and 103 ] line control equipment. 104-106 are control block in line control equipment 103, and the communication link house-keeping section which the protocol processing section which 104 changes the transmitted-and-received-data configuration between a host side circuit and a terminal side circuit, and transmits data, and 105 supervise under connection of a circuit and cutting, and performs creation/renewal of a communication link condition registration table, and 106 are the communications control sections which control connection/cutting of a circuit. Drawing

2 is the example of a communication link condition registration table. Drawing 3 , 4, and drawing 5 are flow charts which show actuation of line control equipment 103.

[0016] Next, the contents of processing of line control equipment are explained about the line-control approach of the gestalt implementation the above 1st, referring to drawing 1 - drawing 5 .

(1) If the protocol processing section 104 receives data, the data will judge the transmission to a terminal unit from host equipment, and the transmission to host equipment from a terminal unit (step S102 of drawing 3 ).

(2) If it is a connection request when it is data transmission to a terminal unit from host equipment, a transmission place judging will be performed (step S114), and the communications control section 106 will connect the circuit to the corresponding terminal (step S115). The communication link house keeping section 105 registers a terminal number, a channel identifier, and access time of day to a communication link condition registration table, and sets to it the flag which shows whether it is under [ line connection ] \*\*\*\*\* (step S116).

(3) If it is a disconnect request, a transmission place judging will be performed (step S111), and the communications control section 106 will cut the circuit to the corresponding terminal (step S112). The communication link house keeping section 105 deletes the item about the terminal from a communication link condition registration table (step S113).

(4) If it is not a connection request or a disconnect request, either, when it is the usual data, a transmission place judging is performed (step S105), and the flag of the terminal with which the communication link house keeping section 105 corresponds with reference to a communication link condition registration table will confirm whether be ON or not (step S106), and if it is ON, the access time of day of a communication link condition registration table will be updated (step S109). The protocol processing section 104 transmits data (step S110).

(5) If a flag is OFF, the communications control section 106 re-connects a circuit (step S107), and the communication link house keeping section 105 will set the flag of the terminal with which a communication link condition registration table corresponds (step S108), and it will update access time of day further (step S109). The protocol processing section 104 transmits data (step S110). Here, that a flag is OFF shows that the circuit which an applicable terminal is using is cut temporarily. In addition, (11) mentioned later explains in detail the conditions from which a flag serves as OFF.

(6) If it is a connection request when it is data transmission to host equipment from a terminal unit, a sending agency judging will be performed (step S126), and the communications control section 106 will connect a circuit with the corresponding terminal (step S127). The communication link house keeping section 105 registers a terminal number, a channel identifier, and access time of day to a communication link condition registration table, and sets to it the flag which shows whether it is under [ line connection ] \*\*\*\*\* (step S128).

(7) If it is a disconnect request, a sending agency judging will be performed (step S129), and the communications control section 106 will cut a circuit with the corresponding terminal (step S130). The communication link house keeping section 105 deletes the item about the terminal from a communication link condition registration table (step S131).

(8) If it is a re-connection request, a sending agency judging will be performed (step S132), and the communications control section 106 will re-connect a circuit with the corresponding terminal (step S133). The communication link house keeping section 105 sets the flag of the terminal of a communication link condition registration table (step S134), and updates access time of day further (step S135).

(9) A connection request is not a disconnect request or a re-connection request, either, when it is the usual data, perform a sending agency judging (step S124), and the communication link house keeping section 105 updates the access time of day of a communication link condition registration table (step S124), and the protocol processing section 104 transmits data (step S125).

(10) the communication link house keeping section 105 checks the access time of day of the terminal registered into the communication link condition registration table for every (step S201 of drawing 5 ) fixed time amount set beforehand (step S202), and is fixed -- judge whether there is any terminal which

has not carried out transmission and reception of data between beyond time amount t2 (step S203).

(14) When there is a terminal which has not transmitted and received the data between fixed time amount, the communication link house keeping section 105 clears the flag of the terminal with which a communication link condition registration table corresponds (step S204), the protocol processing section 104 notifies the purport of cutting temporarily [ circuit ] to the corresponding terminal (step S205), and the communications control section 106 cuts a circuit temporarily (step S206).

[0017] Although a circuit is connected and it is in the condition in which host equipment and a communication link are possible by the above actuation, it becomes possible to increase the total connection number of circuit on appearance, without allowing unnecessary circuit occupancy, since data transmission can be carried out to a terminal unit, without being able to cut a circuit temporarily and host equipment recognizing cutting temporarily about the terminal unit which is not transmitting and receiving data in fact.

(Gestalt of the 2nd operation) Drawing 6 is the block diagram of the whole system in the line-control approach of the gestalt the 2nd operation concerning this invention. As for host equipment and 502, in drawing 6, 501 is [ a terminal unit and 503 ] line control equipment. 504-506 are control block in line control equipment 503, and the communication link house-keeping section which the protocol processing section which 504 changes the transmitted-and-received-data configuration between a host side circuit and a terminal side circuit, and transmits data, and 505 supervise under connection of a circuit and cutting, and performs creation/renewal of a communication link condition registration table, and 506 are the communications control sections which control connection/cutting of a circuit. 507 is the storage section and is a buffer for storing data temporarily. Drawing 7, 8, and drawing 5 are flow charts which show actuation of line control equipment 503.

(1) As for the protocol processing section 504, data \*\*\*\*\* and its data judge the transmission to a terminal unit from host equipment, and the transmission to host equipment from a terminal unit (step S302 of drawing 7).

(2) If it is a connection request when it is data transmission to a terminal unit from host equipment, a transmission place judging will be performed (step S314), and the communications control section 506 will connect the circuit to the corresponding terminal (step S315). The communication link house keeping section 505 registers a terminal number, a channel identifier, and access time of day to a communication link condition registration table, and sets to it the flag which shows whether it is under [ line connection ] \*\*\*\*\* (step S316).

(3) If it is a disconnect request, a transmission place judging will be performed (step S311), and the communications control section 506 will cut the circuit to the corresponding terminal (step S312). The communication link house keeping section 505 deletes the item about the terminal from a communication link condition registration table (step S313).

(4) It is not a connection request or a disconnect request, either, when it is the usual data, a transmission place judging is performed (step S305), and the flag of the terminal with which the communication link house keeping section 505 corresponds with reference to a communication link condition registration table will confirm whether be ON or not (step S306), and if it is ON, the access time of day of a communication link condition registration table will be updated (step S309). The protocol processing section 504 transmits data (step S310).

(5) If a flag is OFF, when it confirms whether there is any empty circuit (step S340) and there is an empty circuit, the communications control section 506 re-connects a circuit (step S307), and the communication link house keeping section 505 sets the flag of the terminal with which a communication link condition registration table corresponds (step S308), and it updates access time of day further (step S309). The protocol processing section 504 transmits data (step S310).

(6) When there is no empty circuit, the protocol processing section evacuates the data from host equipment to the storage section 507 (step S341). Then, as soon as an empty circuit is made, the communications control section 506 re-connects a circuit (step S343), and the communication link status management section 505 sets the flag of the terminal with which a communication link condition registration table corresponds (step S344), and it updates the access time of day of a table further (step



S345). The protocol processing section 504 takes out the data to which it was made to evacuate from the storage section 507, and transmits (step S346).

[0018] About the actuation at the time of being data transmission to host equipment from a terminal unit, and actuation of momentary cutting of a circuit, since it is the same as that of the actuation in the gestalt of the 1st operation, explanation is omitted.

[0019] When there is data transmission from host equipment to the circuit under cutting temporarily and a circuit cannot be immediately connected by the above actuation, it is lost that take data, and spill or an error is notified to host equipment from line control equipment.

(Gestalt of the 3rd operation) Since the block diagram of the system in the line-control approach in the gestalt of the 3rd operation is the same as the block diagram in the gestalt of the 1st operation, explanation is omitted. Drawing 3 , 4, and drawing 9 are flow charts which show actuation of line control equipment 103.

[0020] About the actuation about drawing 3 and the data transmission shown by 4, since it is the same as that of the actuation in the gestalt of the 1st operation, explanation is omitted. Actuation of momentary cutting of a circuit shown by drawing 9 is explained below.

(1) The communication link house keeping section 105 supervises the number of line connections at counting the number of terminals which is the flag ON which was defined beforehand, and which shows under a line connection among communication link condition registration tables for Tevery fixed time amount, and calculates the value T2 in inverse proportion to a circuit activity ratio (step S402).

(2) Check the access time of day of the terminal registered into the communication link condition registration table (step S403), and judge whether there is any terminal which has not carried out transmission and reception of data between beyond T2 (step S404).

(3) When there is a terminal which has not transmitted and received the between data beyond T2, the communication link house keeping section 105 clears the flag of the terminal with which a communication link condition registration table corresponds (step S405), the protocol processing section 104 notifies the purport of cutting temporarily [ circuit ] to the corresponding terminal (step S406), and the communications control section 106 cuts a circuit temporarily (step S407).

[0021] In case the circuit to the terminal which omits data transmission and reception is cut temporarily, in order to change time amount until it judges cutting temporarily by the above actuation according to a circuit activity ratio, it becomes unnecessary to perform cutting / re-connection processing temporarily [ useless ], when there are many empty circuits.

(Gestalt of the 4th operation) In the gestalt of operation shown above, by cutting a circuit temporarily explained the control system of the fundamental line control equipment to which the total connection number of circuit on appearance is made to increase. It is necessary to process in parallel the communications control instruction published from two or more terminals, and in actual line control equipment, when an instruction of two or more line connection / re-connection is published by coincidence, the case where acquisition of one usable circuit is competed can be considered. In this case, since the communication statement on condition of connection of a circuit is published about the circuit cut temporarily, in order to perform a smooth communication link, it is necessary to give priority to and process a re-connection instruction. Moreover, since it is necessary to process the circuit of cutting in fixed time amount to a re-connection instruction temporarily, holding many momentary cutting circuits too much in coincidence needs to avoid.

[0022] Drawing 10 and 11 are flow charts which show actuation of the line control equipment in above-mentioned. drawing 10 and drawing 3 R> of 11 -- a different point from 3 and 4 is the control approach when the data from host equipment to the terminal unit or host equipment from a terminal unit are a connection request (when the judgment of step S103 or step S120 is YES). following and drawing 3 R> -- the contents of processing of line control equipment are explained, referring to drawing 10 and 11 about a different part from 3 and 4.

[0023] First, the control approach when the data from host equipment to a terminal unit are a connection request (when the judgment of step S103 is YES) is explained.

[0024] It judges whether the circuit in which the introduction connection is possible exists at the time. In

not existing, it stands by until an opening arises in a circuit (step S103a). After checking existence of an usable circuit, it judges whether the tooth space which can carry out new registration exists in a communication link condition registration table (step S103b). By preparing an upper limit in the number which can be registered into a communication link condition registration table, the number of connection terminals which increases seemingly can be restricted. Since I hear that the new connection beyond this becomes the hindrance of a smooth communication link and there is when all communication link condition registration tables are in a registration condition, it returns to step S103a once again. When a communication link condition registration table is able to be registered new, it checks next whether the re-connection request has occurred to the communication link in other terminals at coincidence at the time (step S103c). When the re-connection request has occurred, priority is given to re-connection and it returns to step S103a once again. When the re-connection request has not occurred, it can respond to a connection request and the same processing (processing after step S114) as the gestalt of operation of the following 1st is performed.

[0025] The processing same also about the case where the data from a terminal unit to host equipment are a connection request as the above of step S120a to step S120c shown in drawing 10 is performed (when the judgment of step S120 is YES).

[0026] By using the above-mentioned art, the communication mode efficiently processed to the communications control instruction generated at random among two or more terminals is realizable.

[0027] As mentioned above, the communication mode which gave real-time requirement to many terminals compared with the former with the comparatively small number of circuit can be offered by permitting use of other terminals about the circuit in which data transmission and reception are not actually performed, and realizing effective use of a circuit.

[0028] That is, when the received data from a network side and the transmit data by the side of a network do not have line control equipment which connects a network to a host according to the gestalt of the above-mentioned implementation, unnecessary circuit occupancy is avoided, it becomes possible to increase a connection number of circuit seemingly, and the use effectiveness of a circuit is raised. Moreover, even if the need for re-connection occurs during cutting temporarily, the application of a host and a terminal does not need to be conscious of the circuit being cut. Furthermore, it can press down that the latency time occurs in the case of that the number of line connections on appearance increases to infinity, or re-connection of a circuit as much as possible by performing priority attachment to the race condition of a line connection.

[0029] That is, the gestalt of the above-mentioned implementation is momentary cutting and re-connection of a circuit by (1) line-control equipment for the purpose of transmitting economically [ make a line connection easy and ] in a multimedia terminal.

(2) It is a buffer store about transmit data by line control equipment at the time of the waiting for a line connection.

(3) Change the criteria of a communication-link-less judgment according to the use condition of a circuit.

(4) It is mediation control of a cutting condition circuit a new line connection and temporarily.

\*\*\*\*\* \_\_ \*\*

[0030] And when (1) session cuts the circuit by the side of a network temporarily, without ending when the received data from a network side and the transmit data by the side of a network do not have line control equipment which connects a network to a host, in order to attain the above-mentioned purpose, and there is generating of the transmit data from the line connection demand or host side from a terminal side, the circuit cut temporarily [ said ] is connected again and restart continuation of the session is carried out. Moreover, when connection is tried again and the circuit cut temporarily cannot be connected immediately, the transmit data from (2) host side is memorized to a buffer. Furthermore, the use condition of the circuit by the side of (3) networks is supervised, and since [ which controls time amount until it judges that there are not received data from a network side and transmit data by the side of a network ] a number of circuit is increased seemingly, a new circuit is connected instead of the circuit cut temporarily. However, it prevents increasing the number of line connections to infinity by

deciding the maximum of the number of circuit on (4) appearance. When generating of the transmit data from the line connection demand or host side from a terminal side competes, it considers as the configuration of giving priority to re-connection of the circuit cut temporarily.

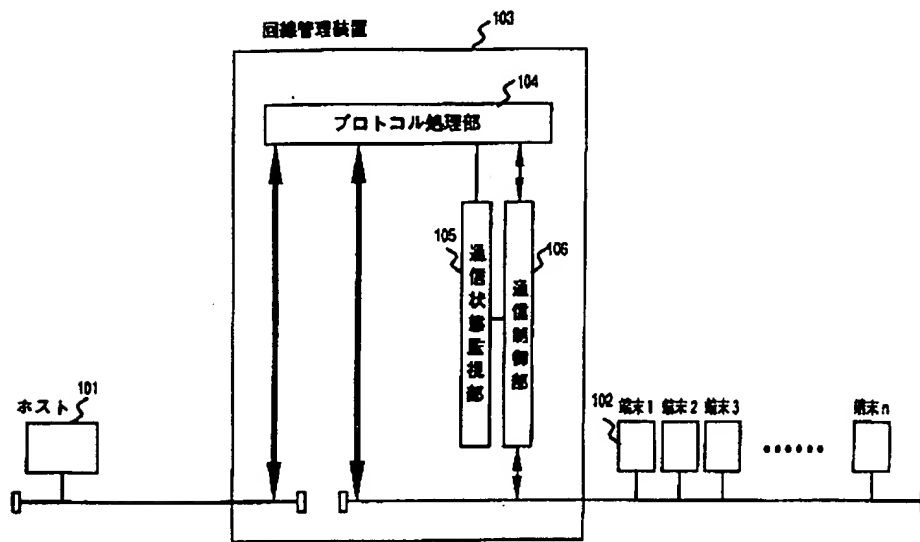
[0031]

[Effect of the Invention] As mentioned above, even if this invention is the same number of circuit, it has the advantage in which a line connection is possible to much more many terminals compared with the former.


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Drawing selection [drawing 1]



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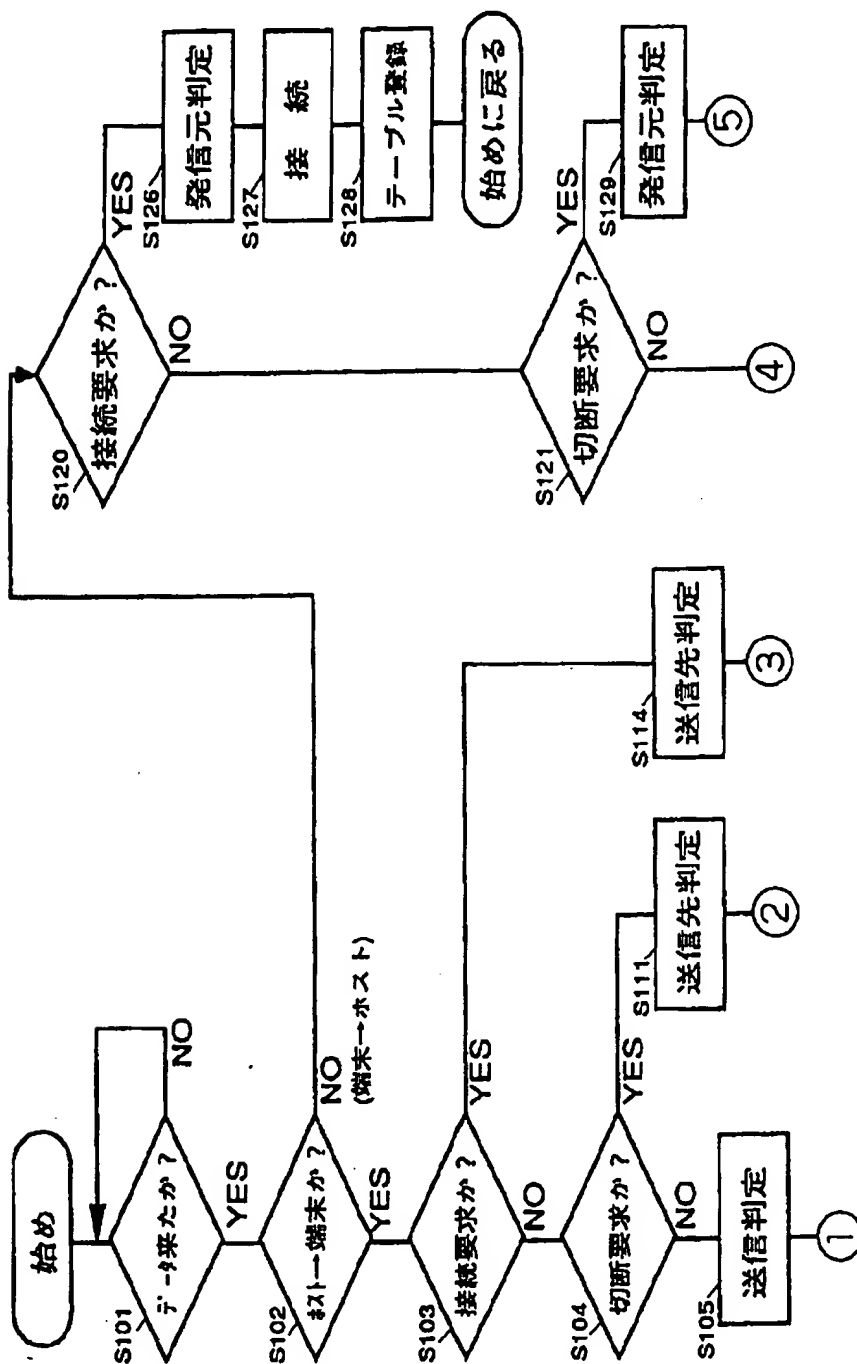
Drawing selection  

## 通信状態登録テーブル

端末番号	チャンネル識別子	アクセス時刻	フラグ
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1650	CH097	21:20	OFF
240	CH056	21:40	ON
⋮	⋮	⋮	⋮

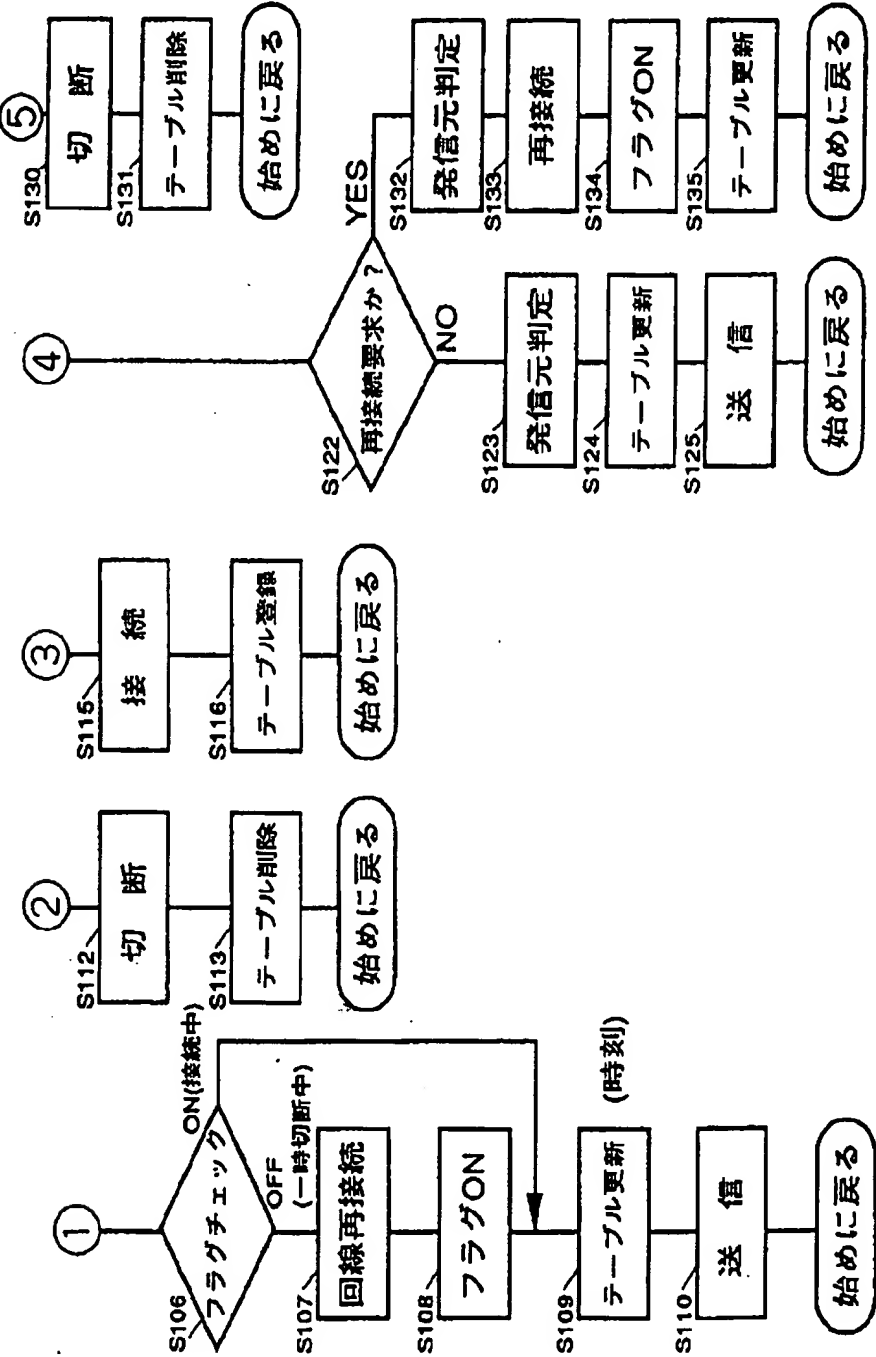
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Drawing selection drawing 3

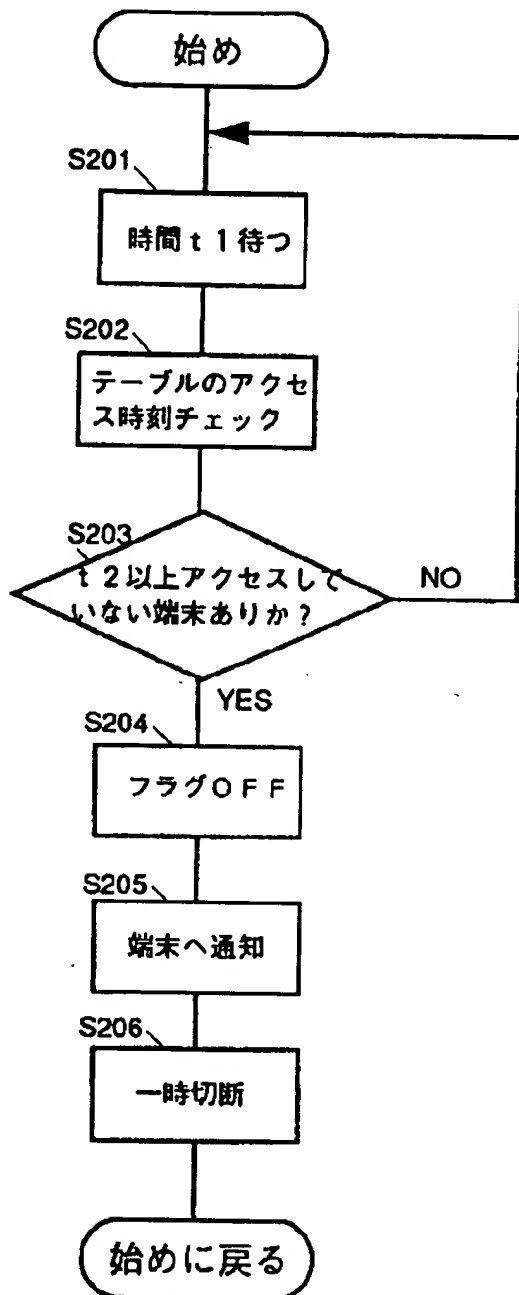


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Drawing selection drawing 4 



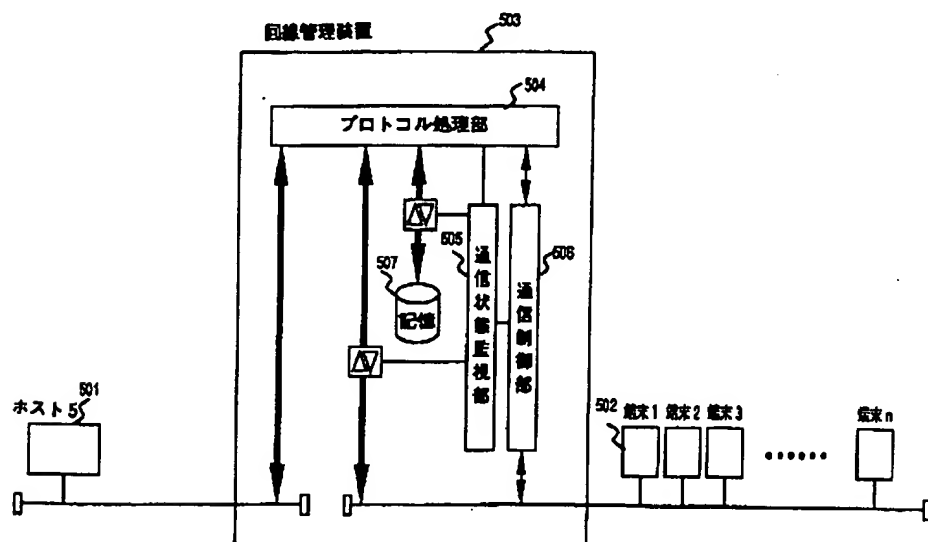
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Drawing selection ☐ drawing 5 ☒

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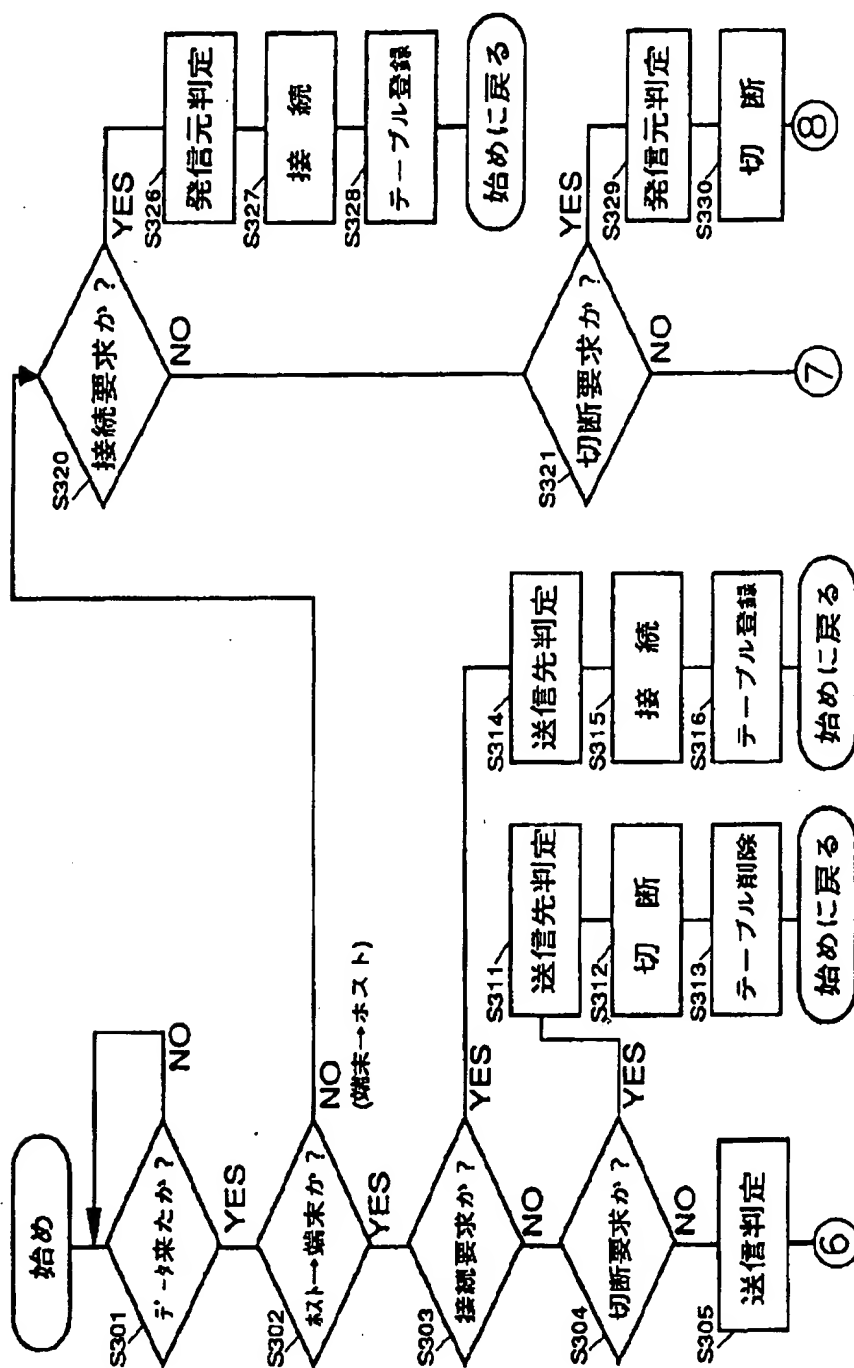


Drawing selection drawing 6



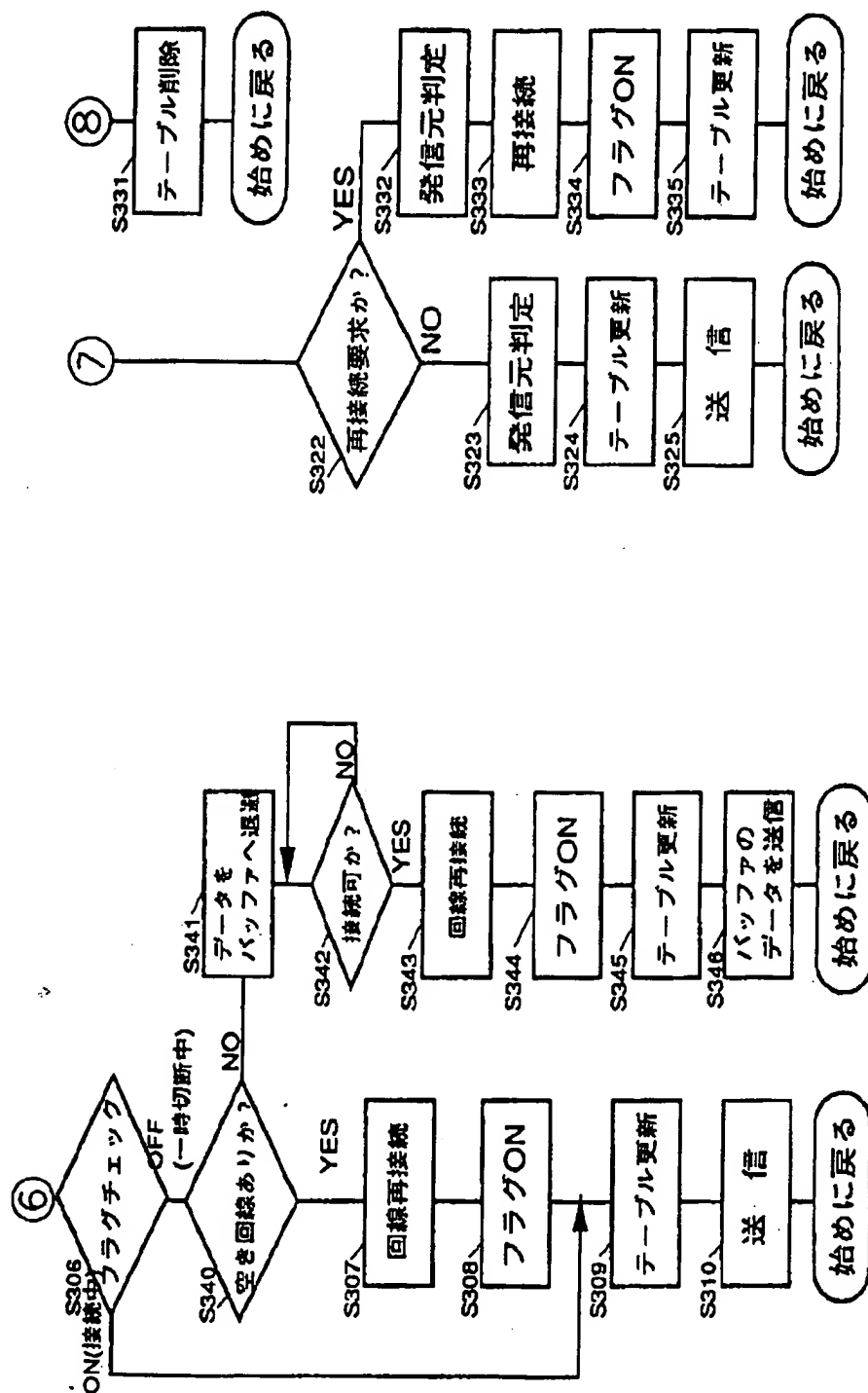
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Drawing selection [drawing 7]



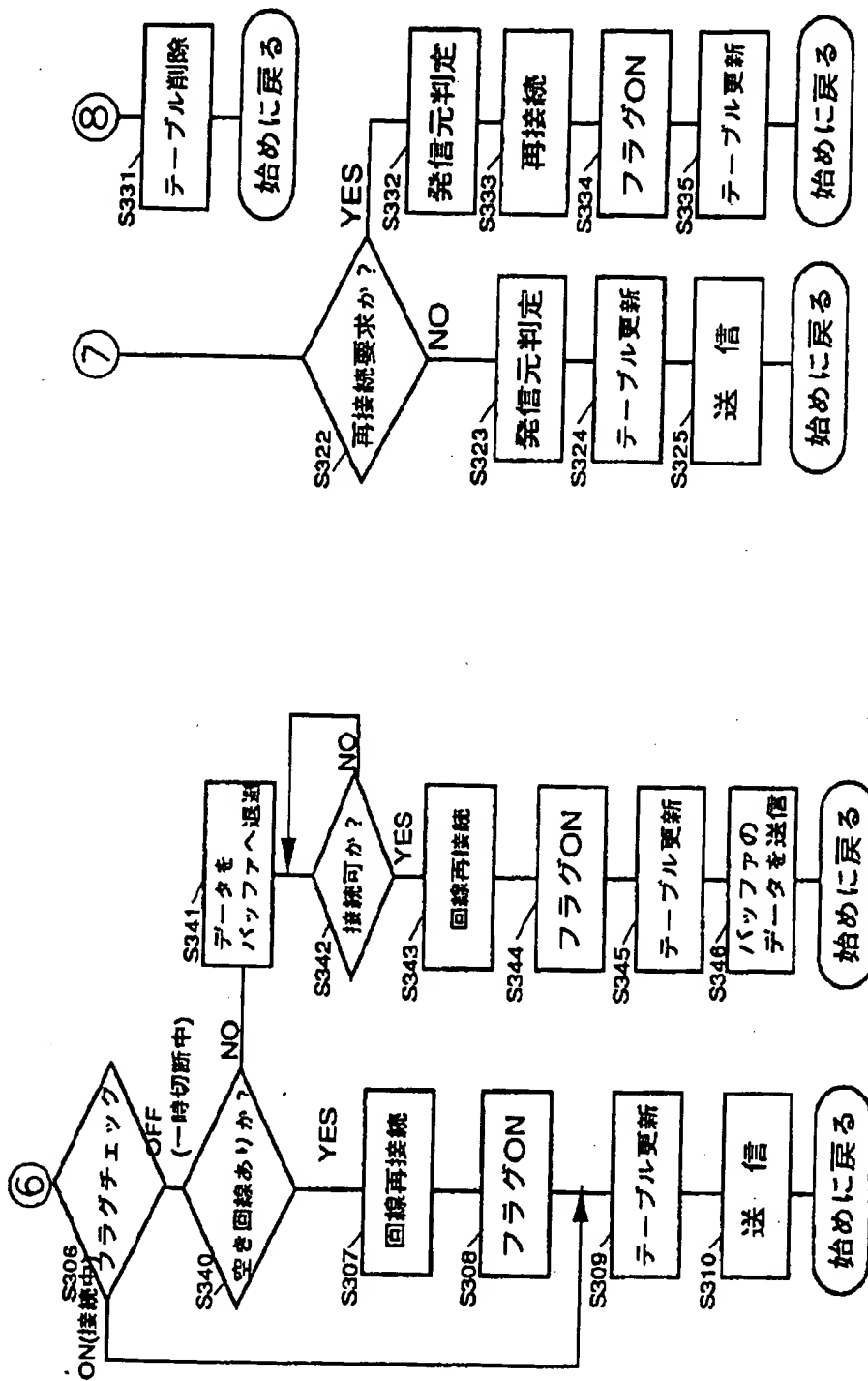
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Drawing selection drawing 8



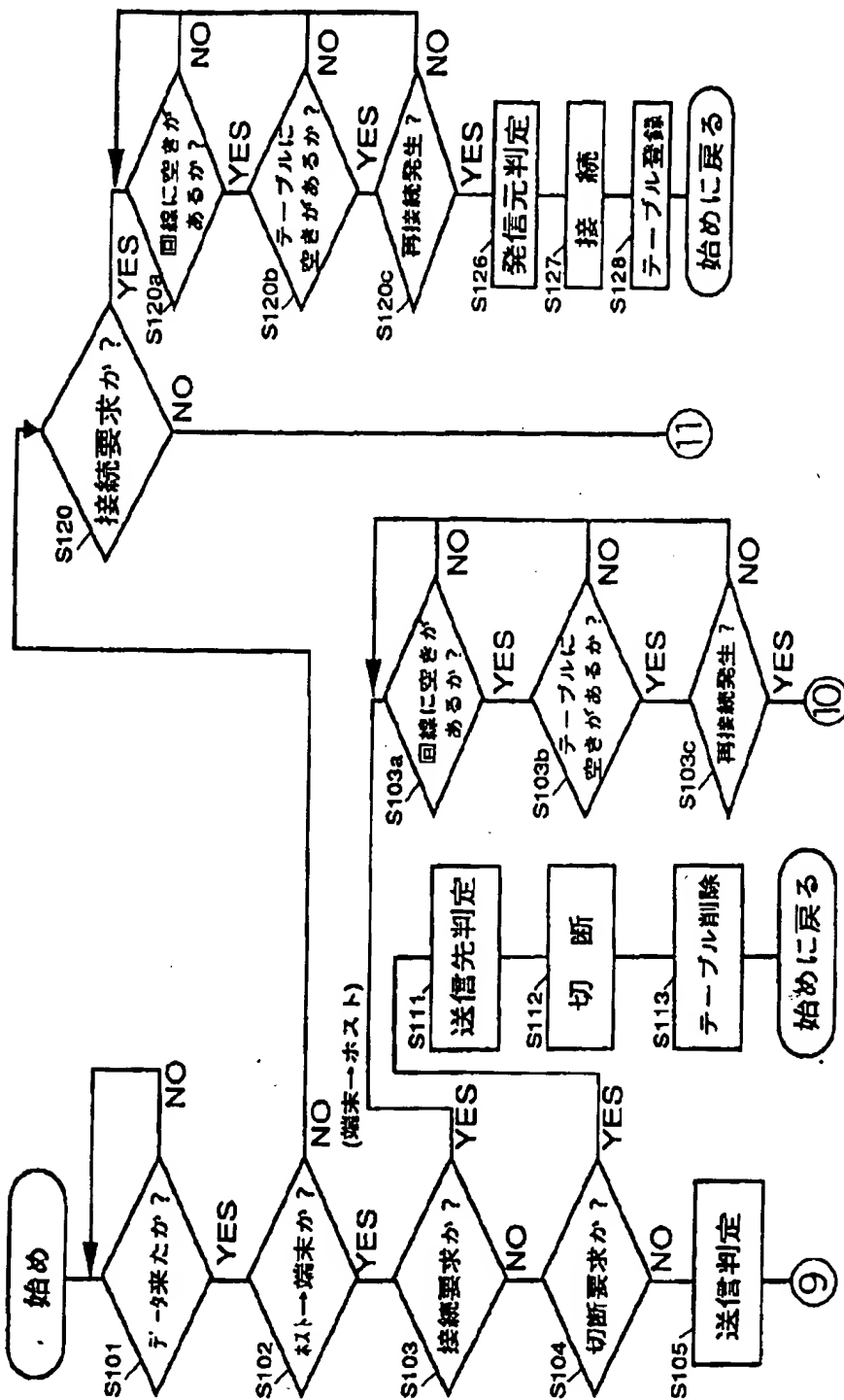
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Drawing selection [drawing 9]



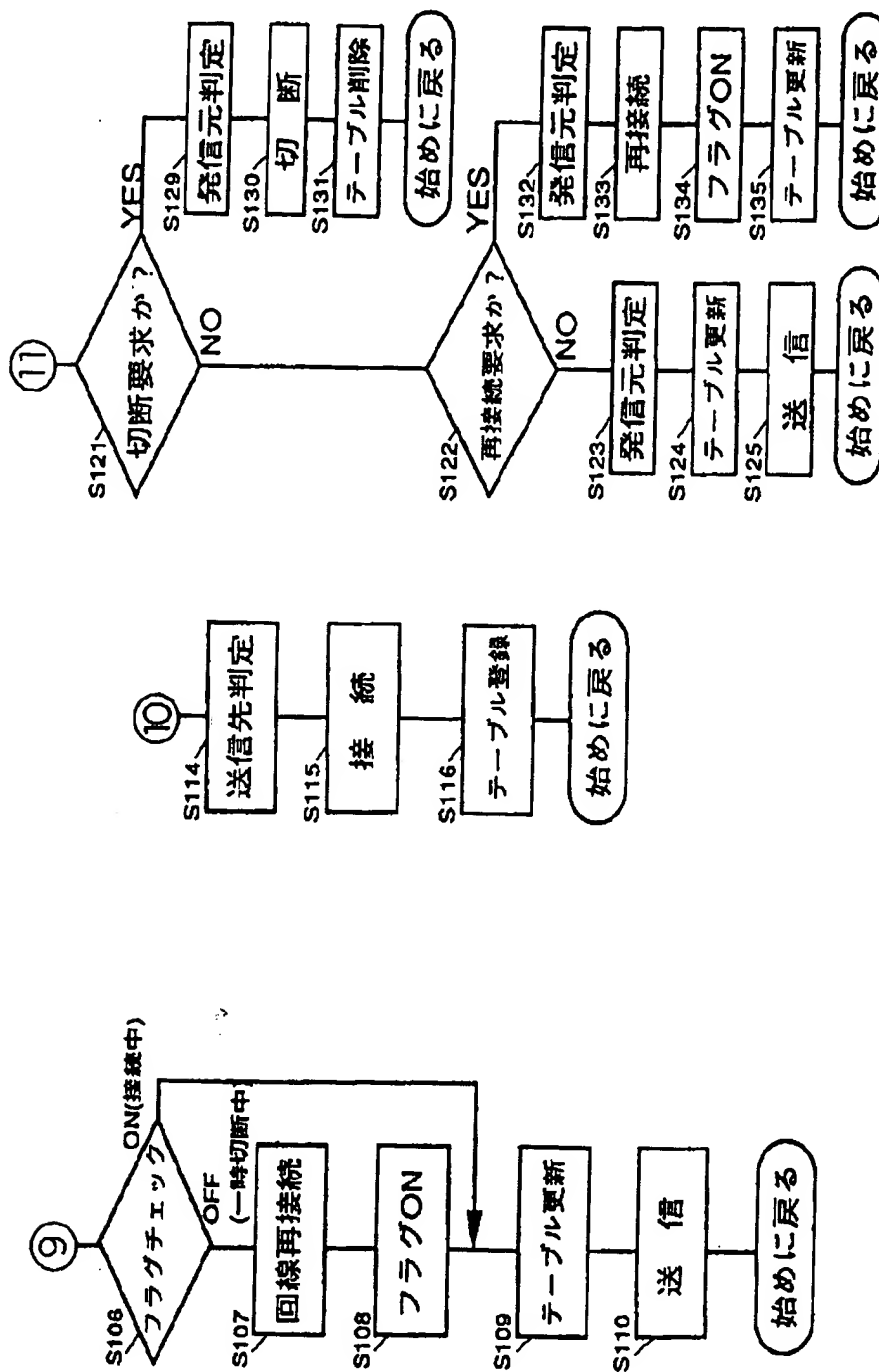
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Drawing selection [drawing 10]



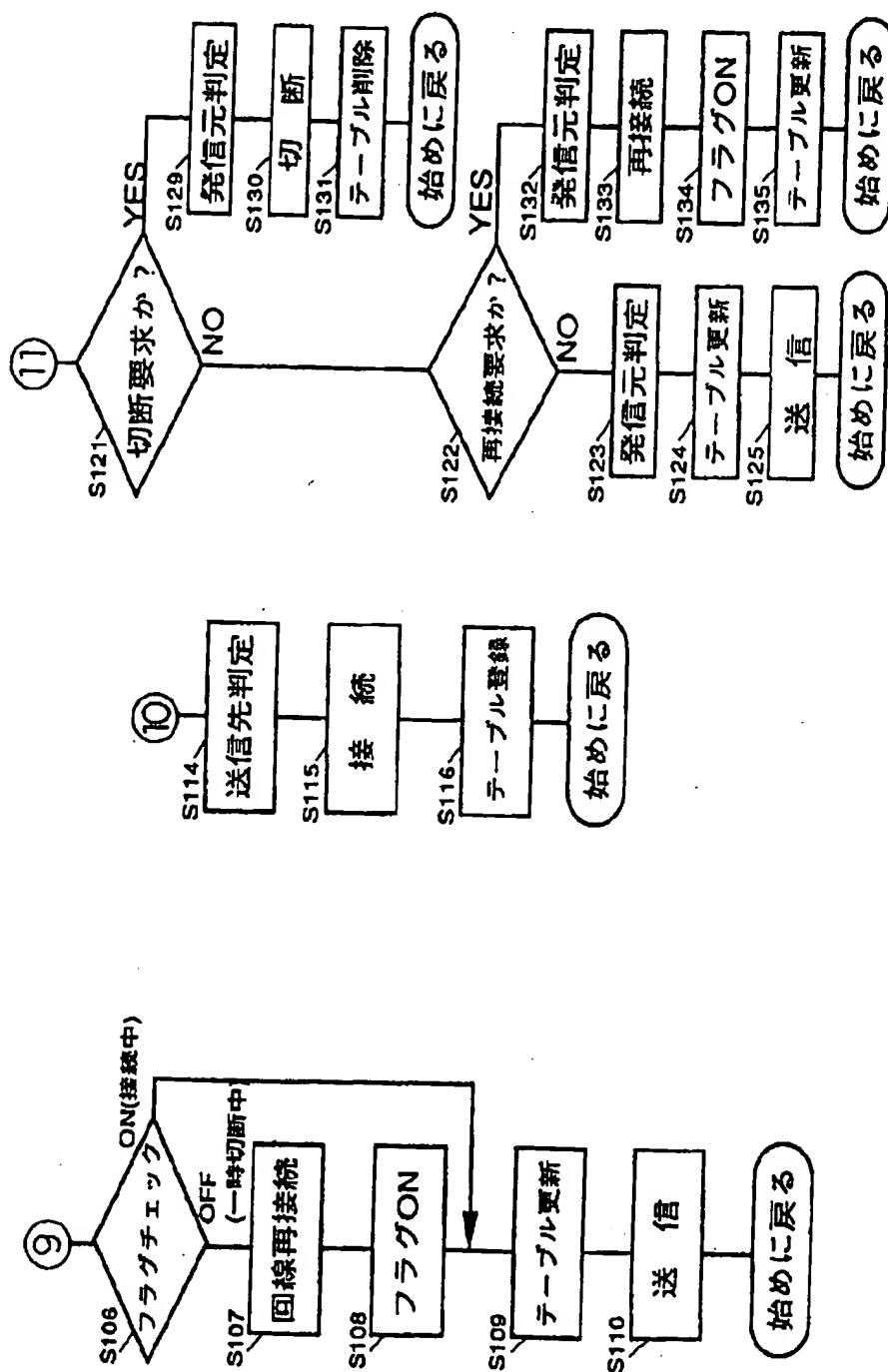
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Drawing selection [drawing 11]



[Translation done.]

Drawing selection drawing 12



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